SNS COLLEGE OF TECHNOLOGY, COIMBATORE-35
(AN AUTONOMOUS INSTITUTION)

UNIT- III

16CET205- HIGHWAY AND RAILWAY ENGINEERING

Factors affecting the Design of Pavements

Design wheel load

- Static load on wheels
- Contact Pressure
- Load Repetition.

Subgrade soil

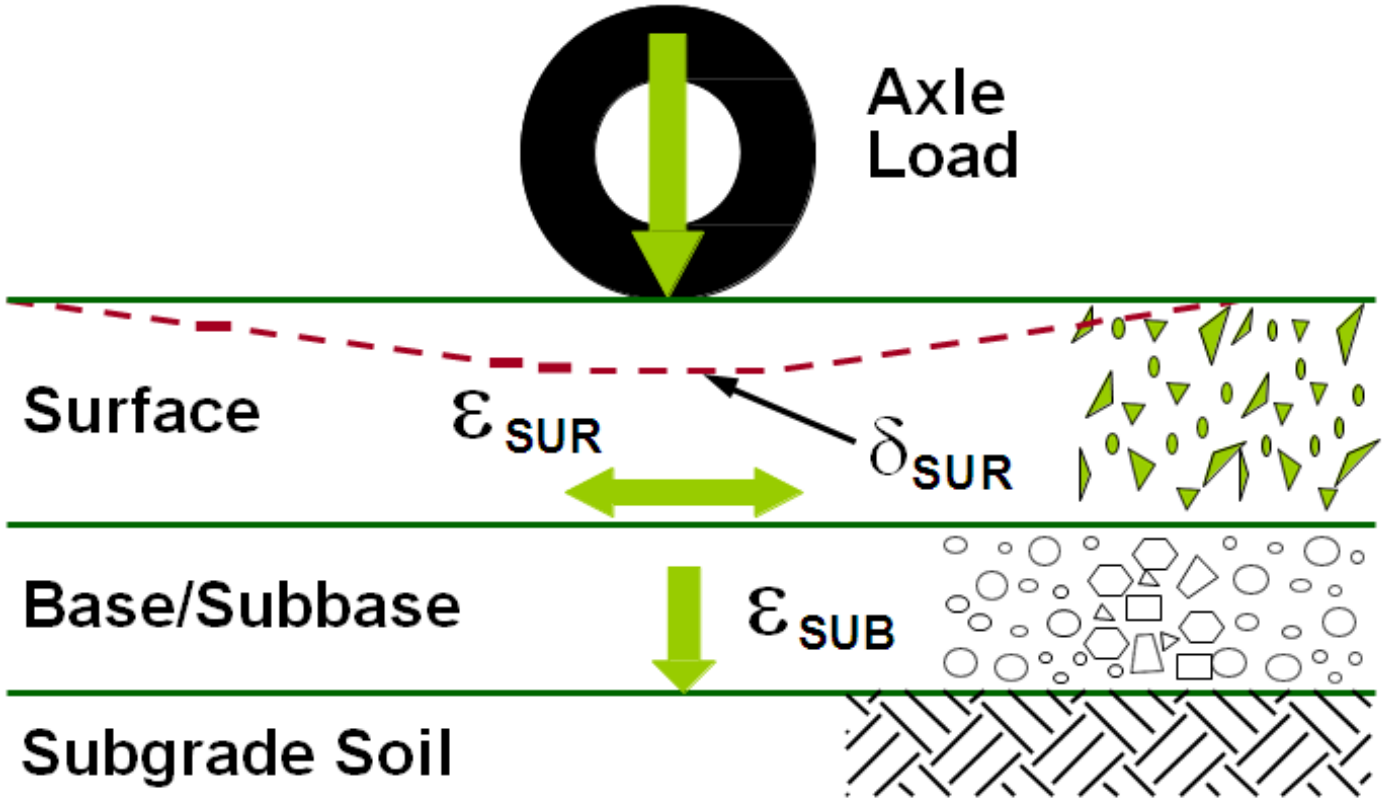
- Thickness of pavement required
- Stress- strain behaviour under load
- Moisture variation

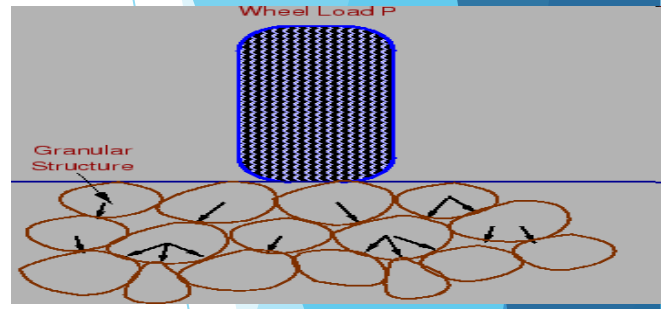
Climatic factors

- Pavement component materials Environment factors
- Traffic Characteristics
- Required Cross sectional elements of the alignment

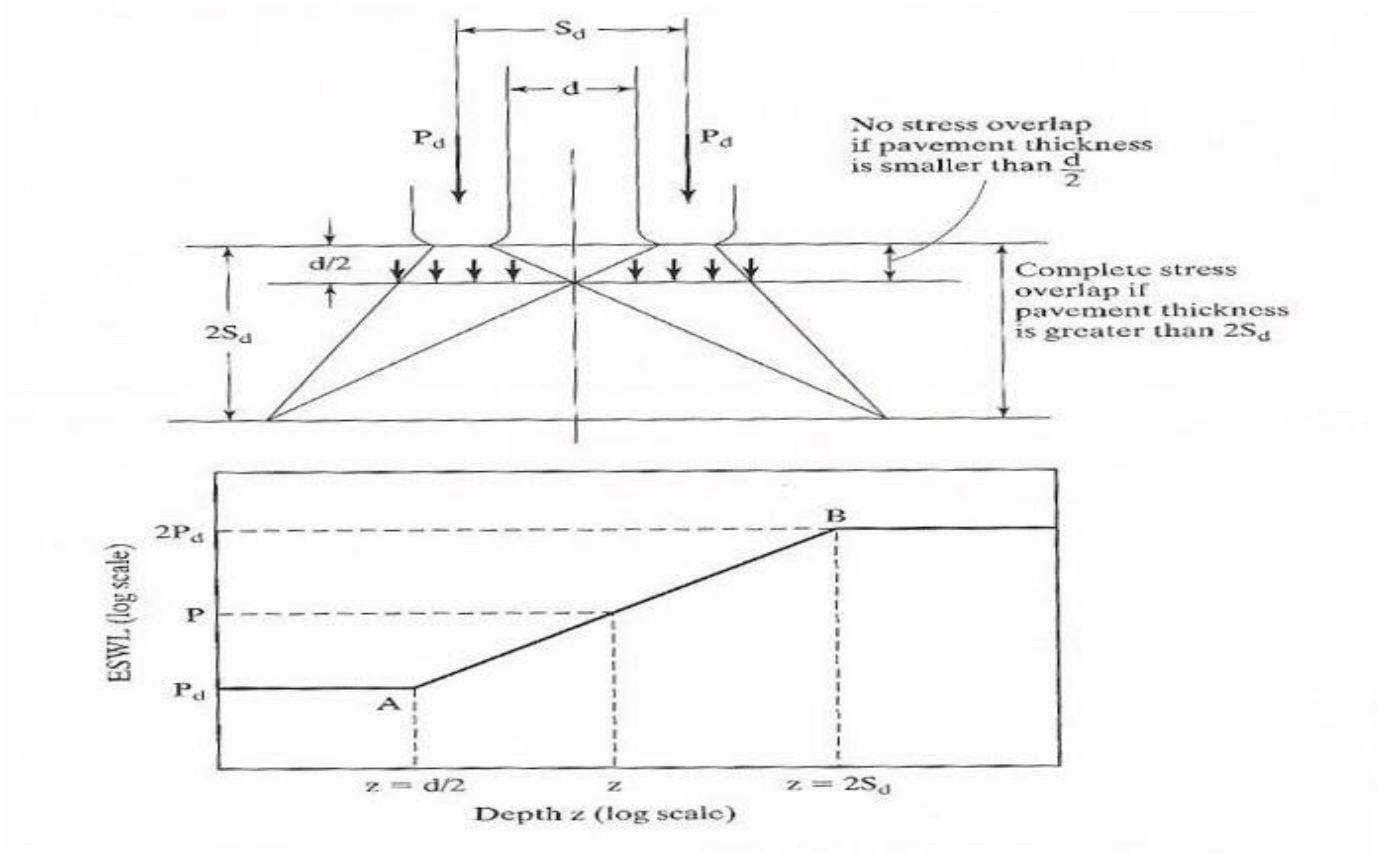
FLEXIBLEPAVEMENT

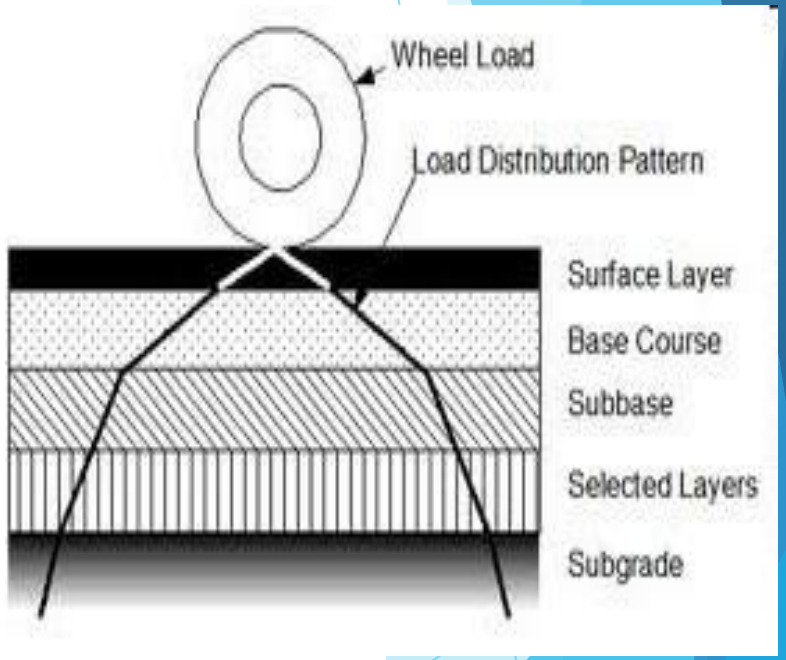
Pavement Responses Under Load





Equal Single Wheel Load (ESWL)



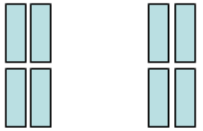


Axle Configurations

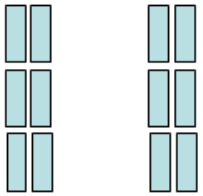
An **axle** is a central shaft for a rotating wheel or gear

Single Axle With Single Wheel
(Legal Axle Load = 6t)

Single Axle With Dual Wheel
(Legal Axle Load = 10t)

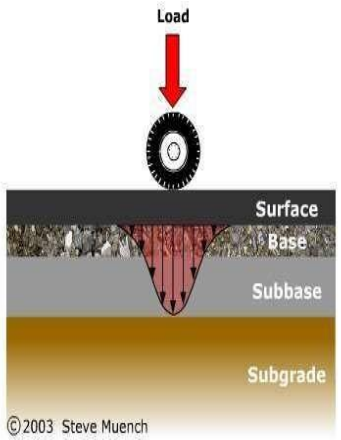


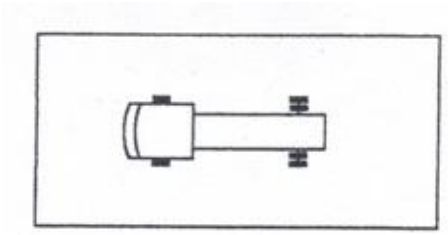
Tandem Axle
(Legal Axle Load = 18t)



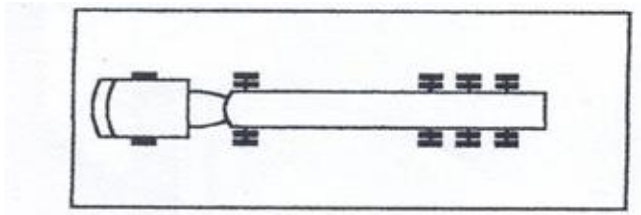
Tridem Axle
(Legal Axle Load = 24t)

Truck Configuration

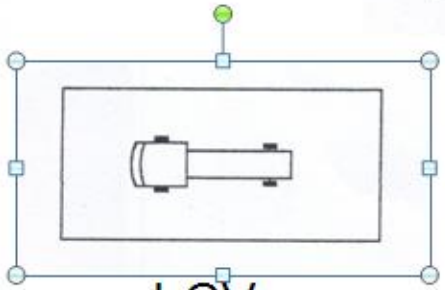




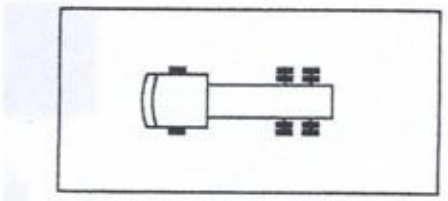
2 Axle Truck – 16t



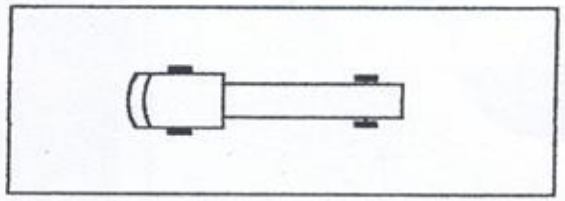
5 Axle Truck – 40t



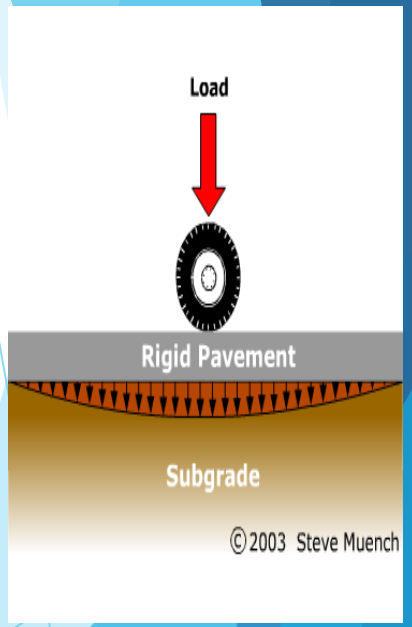
LCV



3 Axle Truck – 24t

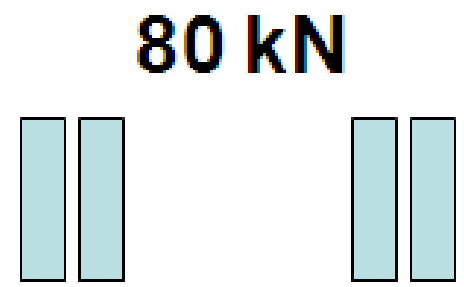


4 Axle Semi Articulated – 34t



Standard Axle

- Single axle with dual wheels carrying a load of 80 kN (8 tonnes) is defined as standard axle



Standard Axle

Evaluation Of Pavement Component Layers

Sub-grade:

- **To Receive Layers of Pavement Materials Placed over it**
- **Plate Bearing Test**
- **CBR Test**
- **Triaxial Compression**

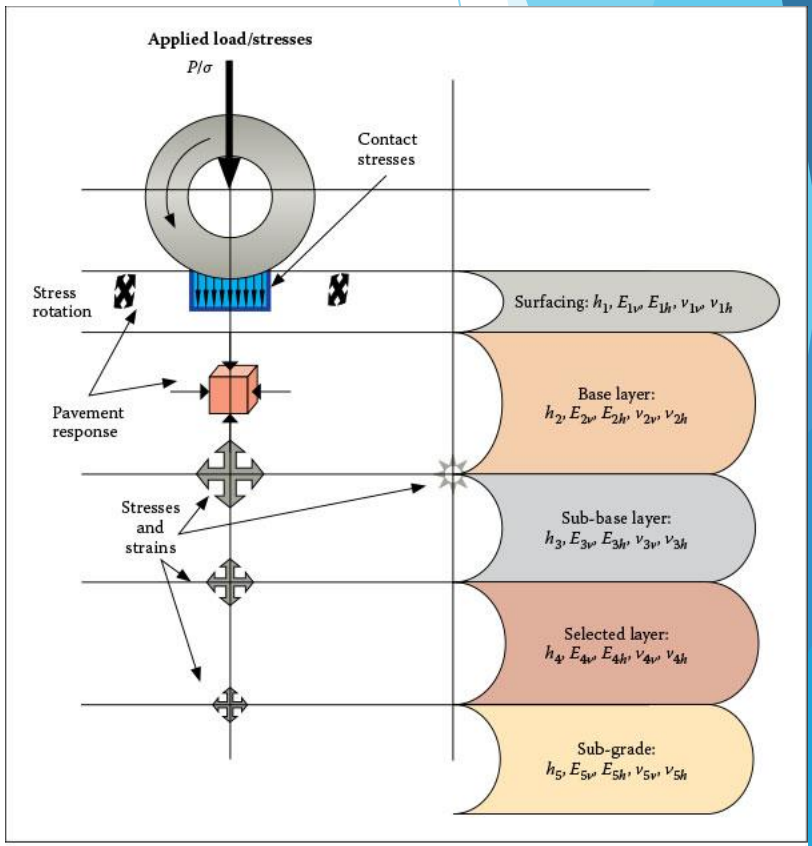


Figure 3 Hypothetical pavement structure

Evaluation Of Pavement Component Layers

Sub-base And Base Course

- To Provide Stress Transmitting Medium
- To distribute Wheel Loads
- *To Prevent Shear and Consolidation Deformation*

In case of rigid pavements to

- Prevent pumping
- Protect the sub grade against frost action
- Plate Bearing Test
- – CBR Test

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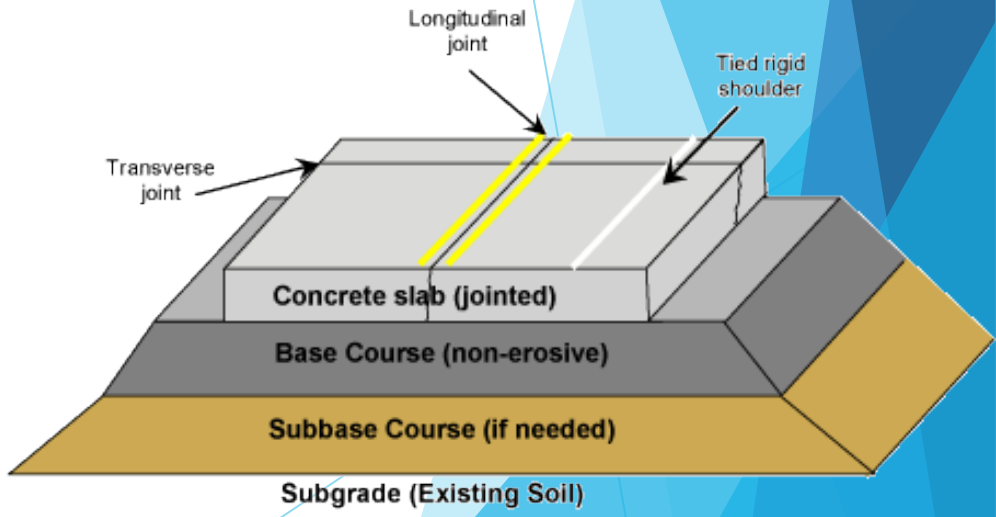
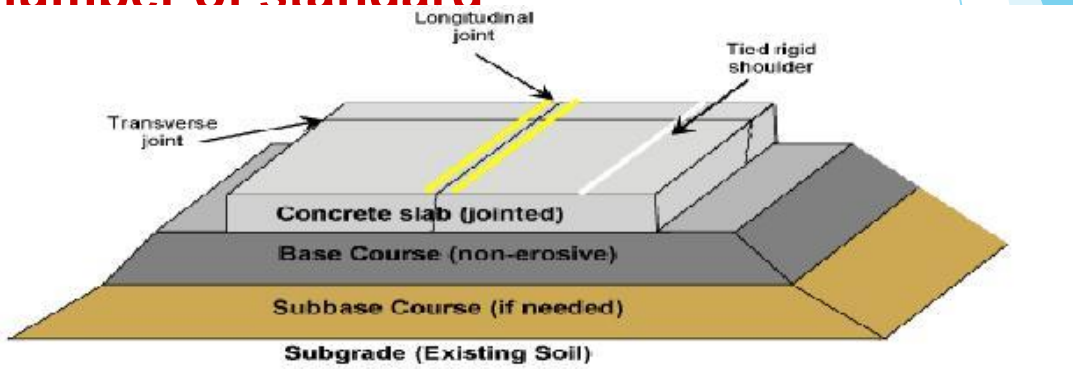
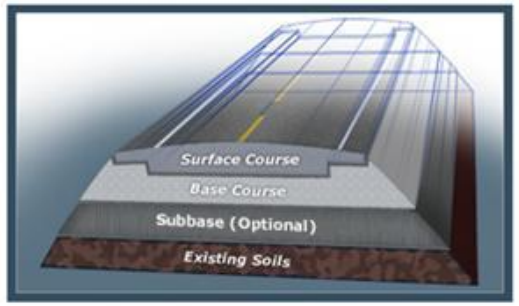


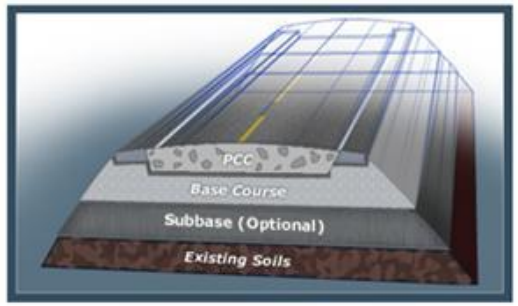
Flexible Pavement Design Using CBR Value Of Sub-grade Soil

- ❖California State Highways Department Method
- ❖Required data
- ❖Design Traffic in terms of cumulative number of standard
- ❖axles(CSA)
- ❖CBR value of sub grade.





Typical Flexible Pavement



Typical Rigid Pavement

Traffic Data

- Initial data in terms of number of commercial vehicles per day (CVPD).

- ¬Traffic growth rate during design life in %
- ¬Design life in number of years.

- ¬Distribution of commercial vehicles over the carriage way

Computation of Traffic for Use of Pavement Thickness Design Chart

$$N = \frac{365 \times A[(1+r)^n - 1]}{r} \times D \times F$$

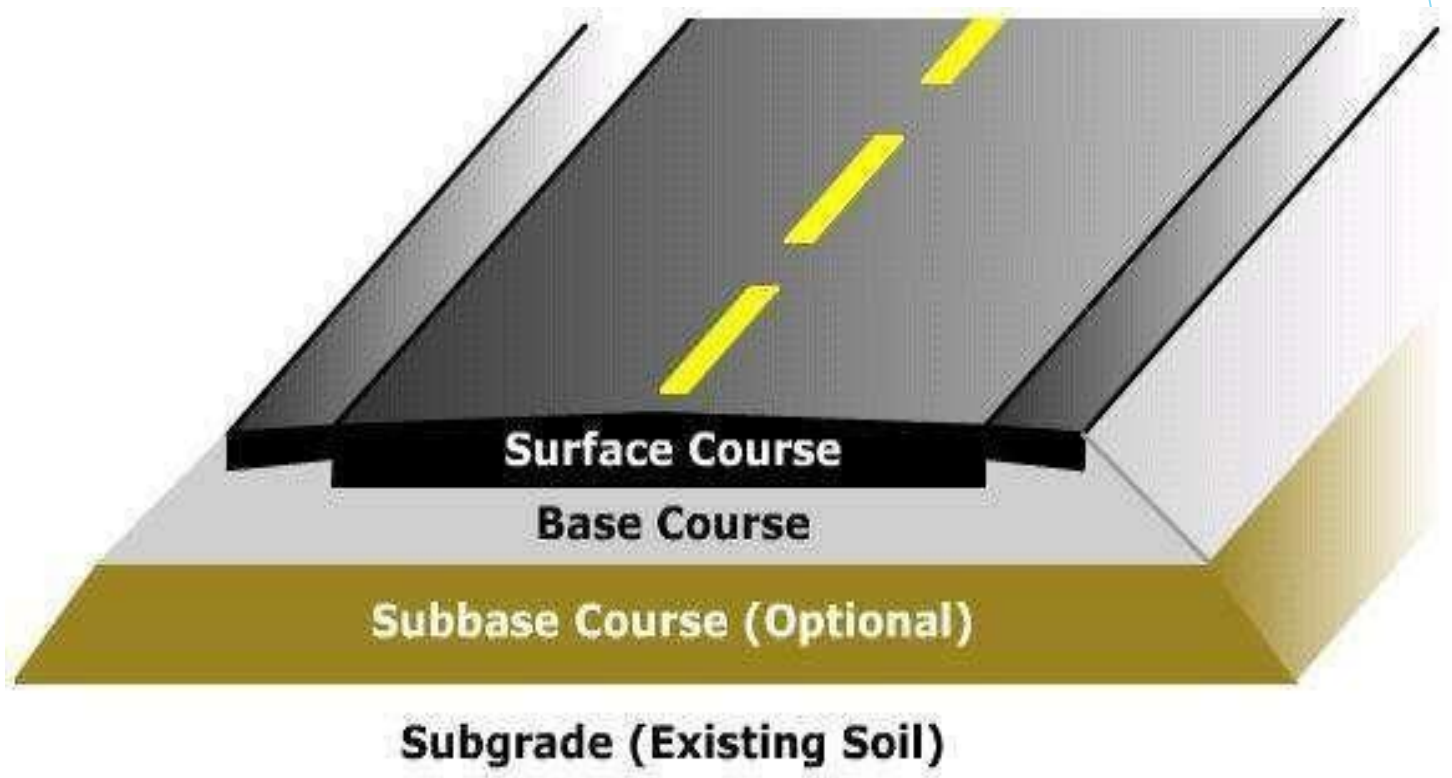
N =Cumulative No. of standard axles to be catered for the design in terms of msa

D =Lane distribution factor

A =Initial traffic, in the year of completion of construction, in terms of number of commercial vehicles per day

F =Vehicle Damage Factor n = Design life in years

r =Annual growth rate of commercial vehicles


Surface Course
Base Course
Subbase Course (Optional)
Subgrade (Existing Soil)